

NEW SPECIES, NEW COMBINATIONS
AND NOTES ON THE GOLDENRODS
(*EUTHAMIA* AND *SOLIDAGO*—*ASTERACEAE*)

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During the last 25 years, we have studied the goldenrods, collecting almost all recognized species and studying them in their native habitat and at their extremes of range. Every state in the United States, except Hawaii, has been visited, as well as most provinces of Canada and the Yukon Territory. *Solidago* and/or *Euthamia* specimens have been examined from the following herbaria: ALA, ALTA, ASTC, ASU, COLO, CONN, CS, CSU, DUR, ECSC, F, FAY, FSU, GA, GH, ILL, KSTC, LAF, MAINE, MARY, MIN, MISS, MO, MONT, MONTU, MUR, MT, ND, NEBC, NLU, NMC, NO, NYS, OCLA, OKL, OKLA, OLDS, OSC, PENN, PH, RM, SAT, SMU, SRSC, TAES, TENN, TEX, TTC, TULS, UAC, UARK, UBC, UNA, US, USCH, USTA, UT, VSC, WIN, WTS, WTV. Over 200 *Solidago* and numerous *Euthamia* types have been examined and photographed. As a result of these studies, the following name changes should be made within these genera.

1. *EUTHAMIA GRAMINIFOLIA* (L.) Nutt. var. **HIRTIPES** (Fern.) C. & J. Taylor, comb. nov.

X *Solidago hirtipes* Fernald, *Rhodora* 48: 65. 1946. TYPE: VIRGINIA. Sussex Co.: roadside; thicket about 1.5 m N of Waverly, 13 Sep 1945, *Fernald and Long 15015* (GH!, PH!).

Fernald described this taxon indicating its probable origin from hybridization between *E. graminifolia* and *E. microcephala* (Greene) Bush [the latter is a synonym of *E. tenuifolia* (Pursh) Nutt.] There is no evidence that this taxon is a hybrid. All characters including leaf length and width, number of flowers, pubescence, and height are similar to *E. graminifolia* var. *nuttallii* (a scabrous-pubescent variety) except that rather than glomerate heads, they are mostly pedicellate. Two other species of *Euthamia*, *E. tenuifolia* and *E. gymnospermoides* have heads pedicellate. In these species, the heads are more glomerate in plants growing at the northern end of their range.

Both *Euthamia graminifolia* var. *graminifolia* (the glabrous variety), and *E. g.* var. *nuttallii* are abundant in the northeastern United States and Canada. They appear to integrate as we have seen specimens vary from essentially glabrous through all densities to very pubescent. The variety *hirtipes* is uniformly medium pubescent. It ranges from the coastal plain of southeastern

Virginia south through the Carolinas, and from the Gulf coast of central western Florida westward to Vermilion Parish in coastal Louisiana (Fig. 1). Examination of material at FSU, GA, VSC yielded no specimens collected along the southern Atlantic coast of Georgia and Florida. Sieren (1970, 1981) reports this plant only from Virginia and the Carolinas. However, Louisiana and Alabama specimens date back to the 1800's and Mohr (1901) lists *E. graminifolia* for Mobile County, Alabama as does Lelong (1977). These Gulf coast plants are not mentioned in the discussion under the taxa *hirtipes* or *graminifolia* by Sieren (1970, 1972, 1981).

2. *EUTHAMIA TENUIFOLIA* (Pursh) Nutt. var. *PYCNOCEPHALA* (Fern.)
C. & J. Taylor, comb. nov.

Euthamia galetorum Greene. Leaflet. Bot. Observ. Crit. 2:152. 1911. TYPE: CANADA. NOVA SCOTIA: margin of Lake Pleasant, near Springfield, 8 Aug 1910, E. L. Greene s. n. (ND-G 59!).

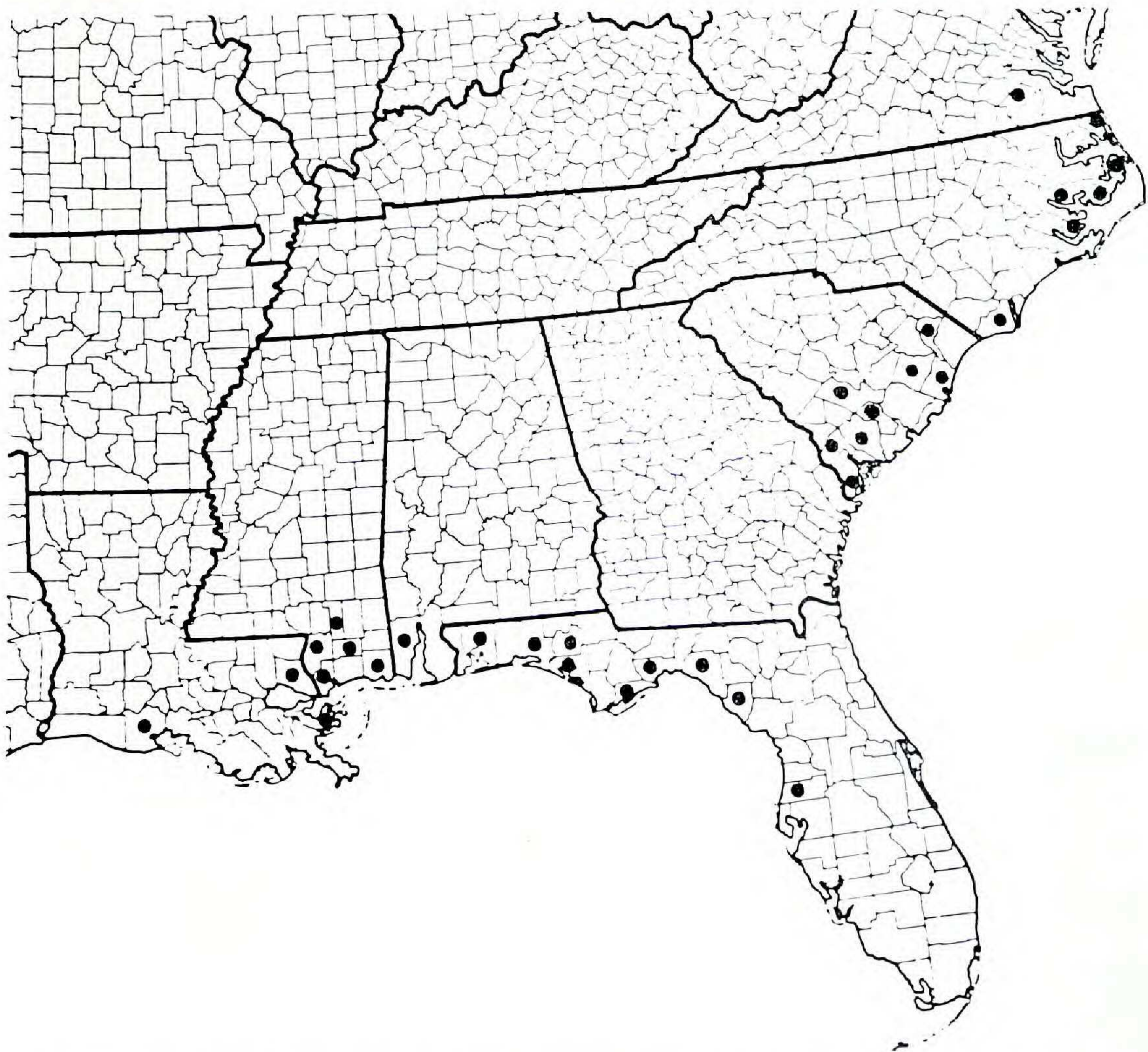


Figure 1. Distribution of *Euthamia graminifolia* (L.) Nutt. var. *hirtipes* (Fern.) C. & J. Taylor.

Solidago tenuifolia Pursh var. *pycnocephala* Fern. Rhodora 23:293. 1921. TYPE: CANADA. NOVA SCOTIA. Yarmouth: wet lower peaty and cobbly beach of Salmon (Greenville) Lake, 13 Aug 1920, Fernald, Bissell, Graves, Long, and Linder 22743 (GH!, PH!, US!).

Solidago graminifolia (L.) Salisb. var. *galetora* (Greene) House. New York State Mus. Bull. 243–244: 45. 1923.

Solidago galetorum (Greene) Friesner. Butler Univ. Bot. Stud. 3(1):58. 1933. [Sieren (1981) cites "*Euthamia graminifolia* (L.) Nutt. var. *galetorum* (Greene) Friesner, Butler Univ. Bot. Stud. 3(1): 58. 1933" as a synonym. This name is a typographical error. Friesner was evidently citing *S. g.* var. *galetora* (Greene) House as a synonym and the *S.* was misprinted as an *E.*]

This taxon has been considered an endemic Nova Scotia species and as a variety of both *S. graminifolia* and *S. tenuifolia*. Field studies along with examination of types and other herbarium specimens support Fernald's treatment as a variety of *tenuifolia*. The proper combination had not been made under the genus *Euthamia*.

3. SOLIDAGO ALTIPLANITIES C. & J. Taylor, sp. nov.

Plantae perennes caespitosae et per rhizomata repentes extendentes colonias parvas facientes, usque ad 5–8 dm altae; caulis pilis brevis distaliter adpressis dense vestitis; foliis basalibus per anthesin deciduis, foliis caulis principalis magnitudine aequalibus; foliis linearibus, plerumque 6–9 cm longis, 5–6 mm latis, triplinervis, subglabris vel dense pubescentibus apprime in nervo medio, marginibus ciliatis; inflorescentiis terminalibus, paniculatis, usque ad 30 cm altis et 20 cm latis, ramis erectis, plerumque non recurvis sed capitulis secundis, in pedicellis brevis bracteis brevis numerosis 2 mm longis, 0.5 mm latis; bracteis involucri triseriatis vel quadriseriatis, 5 mm altis, glabris marginibus ciliatis apicem versus, marginibus infernis membranaceis; floribus (10) 12–14 (20) per capitulum, floribus ligulatis atque discis aequalibus, acheniis perberulis.

Perennial in clumps and spreading by creeping rhizomes to form small colonies; up to 5–8 dm tall, stem densely pubescent with short upwardly appressed hairs, basal leaves deciduous at time of flowering, leaves similar in size on the primary stem; leaves linear usually 6–9 cm long, 5–6 mm wide, triple nerved, nearly glabrous to densely pubescent especially on the midrib, margins ciliate, inflorescence terminal, paniculate, up to 30 cm tall and 20 cm wide, branches erect, generally not recurved, but heads secund on short pedicels with numerous short bracts 2 mm long, 0.5 mm wide; involucre bracts imbricate in 3 or 4 rows, 5 mm long, bracts glabrous with ciliate margins near the tip, the lower margins membranous; flowers (10) 12–14 (20) in a head, ray and disk flowers equal, achenes pubescent.

Etymology: Based on its occurrence in the High Plains region of Oklahoma and Texas.

TYPE: OKLAHOMA. Jefferson Co.: escarpments of the Red River, NW of OK Hwy 79 bridge, about 5.6 mi SW of Waurika, 9 Oct 1981, J. & C. Taylor 31007 (HOLOTYPE: DUR; ISOTYPES: GH, MO, NLU, NY, OCLA, SMU, US, WTS) (Fig. 2).

Plants occur on gypsum and shale bluffs along canyons usually adjacent



Figure 2. Holotype of *Solidago altiplanities* C.&J. Taylor.

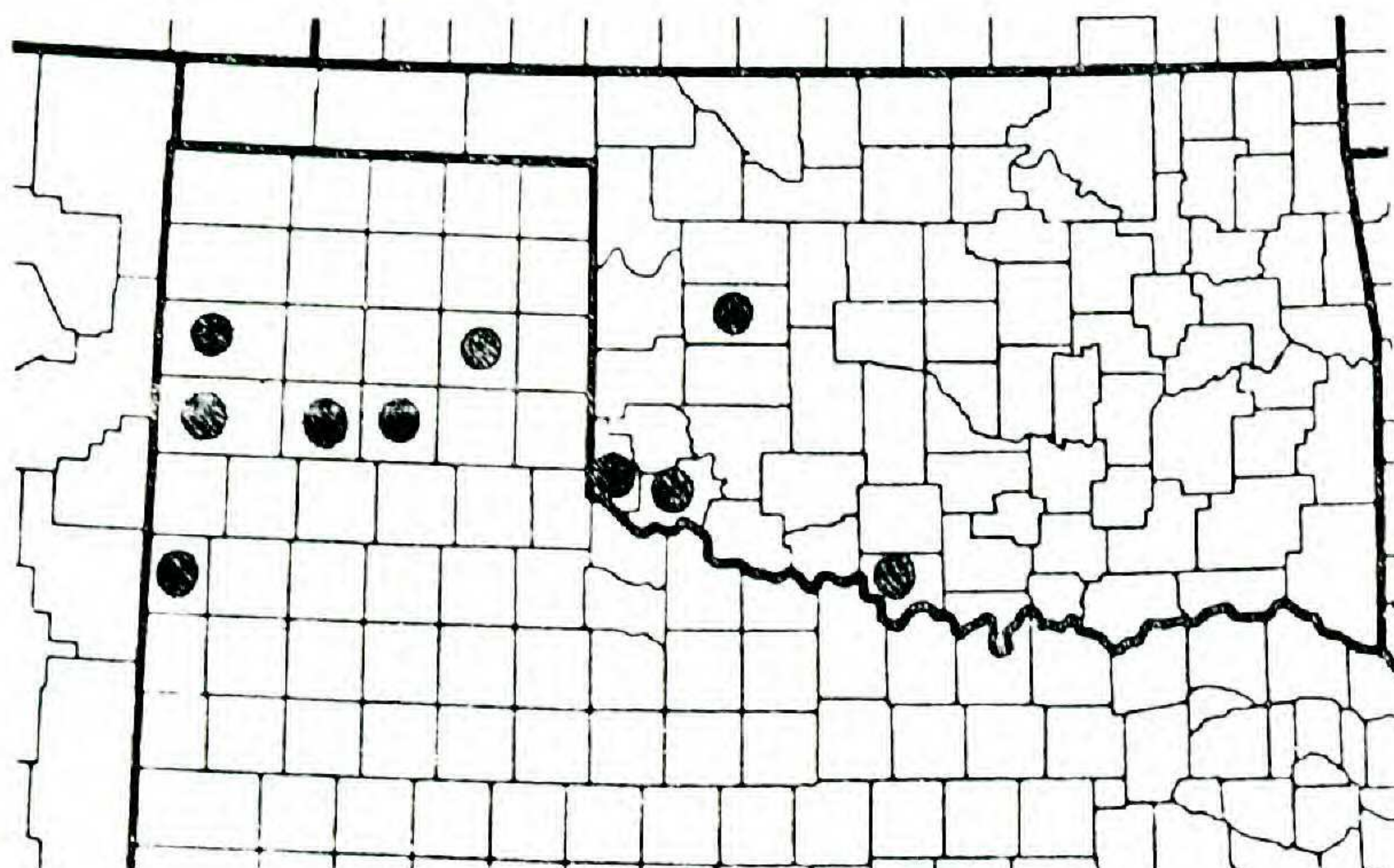


Figure 3. Distribution of *Solidago altiplanities* C.&J. Taylor.

to stream or river valleys. The soils are poor, forming muck when wet. The type specimen was collected during a year of good rainfall. Plants modified by environmental conditions have a much smaller inflorescence, sometimes even producing a tight cylindrical panicle. Plants are much smaller in height with shorter (4–5 cm) leaves under conditions of drought or when growing in areas of poor rain infiltration.

Plants are often found growing with *Solidago petiolaris* and *S. mollis*. Pubescence and size of flower heads are similar to *S. canadensis* and might indicate affinities with that species; however, erect inflorescence branches, and linear leaves cause it to not resemble any of the varieties of that species. While their ranges overlap, their habitats are markedly different.

Specimens examined (Fig. 3): OKLAHOMA. CUSTER CO.: north edge of I-40 on east side of Bear Creek Valley, gypsum and red marl soils, 6.5 mi E of Clinton, 21 Oct 1982, *C. Taylor* 31791 (DUR, SMU), north side of I-40, 8 mi W of Weatherford, 24 Oct 1982, *Taylor* 31812 (DUR, SMU); HARMON CO.: rocky hills south of Salt Fork of the Red River about 8.2 mi NW of Vinson, near bridge of OK Hwy 30, 29 Sep 1978, *J. Taylor and J. Sandidge* 27006 (DUR), along escarpment at top of canyon 0.8 mi S of the Elm Fork of the Red River along OK Hwy 30, 10 Oct 1981, *J. & C. Taylor* 31057 (DUR, SMU); JACKSON CO.: gypsum bluffs overlooking Red River, 4 mi S and 4 mi E of El Dorado, 4 Oct 1975, *C. and J. Taylor* 20782 (DUR), escarpments and canyons in eroded red shale and gypsum on north side of Red River, 3.4 mi S and 3.5 mi E of El Dorado, 28 Sep 1978, *J. Taylor and J. Sandidge* 26459 (DUR); JEFFERSON CO.: along the Red River, 5.6 mi SW of Waurika, 29 Sep 1978, *Taylor & Sandidge* 26940 (DUR), from section line road 0.3 mi N of US Hwy 70, 3 mi E of the Jefferson-Cotton County line, 4 Oct 1975, *J. & C. Taylor* 20614 (DUR). TEXAS. ARMSTRONG CO.: occasional on caprock ledges, Palo Duro Canyon, 15 mi S. of Claude, 7 Oct 1967, *F. R. Waller, Jr.* 1964 (DUR); BAILEY CO.: Sand dunes, 1 mi S of Muleshoe, 1 Sep 1969, *T. C. Rorson* 1694 (DUR); DEAF SMITH CO.: occasional, rocky slopes above Tierra Blanca Creek in Hereford, 20 Aug 1967, *F. R. Waller, Jr.* 1519 (SMU), loam

slopes along Tierra Blanca Creek, 6 mi SW of Hereford, 11 Sep 1966, *F. R. Waller* 1212 (SMU), arroyo in redbeds below caprock breaks, South Bridwell Ranch, 17 Sep 1967, *F. R. Waller* 1583 (SMU); GRAY CO.: along RR track near small grain building in McLean, 24 Oct 1982, *C. Taylor* 31801 (DUR, SMU); OLDHAM CO.: 4 mi E of Glen Rio, 19 Oct 1945, *Cory* 50379 (GH), along I-40 on the west facing escarpment zone at the west edge of the Staked Plains 14 mi E of Glen Rio, 21 Oct 1982, *C. Taylor* 31796 (DUR, SMU); RANDALL CO.: Palo Duro Canyon, 18 Oct 1975, *J. & C. Taylor* 20917 (DUR), and Palo Duro State Park, 20 Oct 1945, *Cory* 50406 (GH).

4. SOLIDAGO CAESIA L. var. CAESIA Sp. Pl. 2:879. 1753.

S. flexicaulis L. as to specimen in LINN, but not description in Sp. Pl. 2:879.

S. caesia var. *axillaris* (Pursh) Gray. Proc. Amer. Acad. Arts 17:189. 1882.

S. axillaris Pursh, Fl. Amer. Sept. 2:542. 1814.

KEY TO THE VARIETIES OF *S. CAESIA*

1. Plants glabrous to very sparsely pubescent.
 2. All flowers axillary in the axis of leaves, which are similar in size and shape to the stem leaves
 3. Stem round, leaf blade not decurrent on the stemvar. *caesia*
 3. Stem striate, square-shaped, leaf blade becoming decurrent down the stemvar. *curtisii*
 2. Lower flowers axillary in leaves, upper leaves becoming smaller and bract-like, producing a terminal inflorescence.....var. *paniculata*
1. Plants pubescent, tomentose-villous above.....var. *hispida*

4a. SOLIDAGO CAESIA var. CURTISII (T. & G.) C. & J. Taylor, comb. nov.

Solidago curtisii T. & G., Fl. N. Amer., 2:200. 1842. TYPE: NORTH CAROLINA. Black Mountains, Alt. 4500 ft, Sep, *A. M. Curtis* 1310 (PH!).

In Torrey and Gray's descriptions we find that the differences in the two species as they described them were: *S. caesia* stem terete, glabrous and *S. curtisii* stem striate-angled, nearly glabrous. The stem terete and striate-angled is the main character used to separate the plants in manuals. In the type specimen of *S. curtisii* at PH, the sessile leaf is about 1 mm wide on each side of the midrib where the leaf attaches to the stem. Thus the leaf is slightly decurrent on the stem and produces the striate stem character used to separate the taxon. Both *S. caesia* and *S. curtisii* are distinctly different from other *Solidagos* with their lanceolate serrate leaves and small axillary clusters of heads. Examination of both herbarium specimens and plants in the field indicate that there is no difference in habitat or other growth conditions that would not be apparent from herbarium specimens, and therefore we feel that the maintenance of *S. curtisii* as a separate species is unwarranted. Other named varieties are pubescent or are plants where the upper leaves have become reduced and bract-like changing the appearance from all flowers axillary to that of having a somewhat terminal prolonged raceme or narrow panicle.

4b. *SOLIDAGO CAESIA* var. *PANICULATA* Gray, Proc. Amer. Acad. Arts 17:189. 1882.

S. gracilis Poir., Encycl. 8:476. 1808.

S. flaccidifolia Small, Bull. Torrey Bot. Club 25:477. 1889.

4c. *SOLIDAGO CAESIA* var. *HISPIDA* Wood, Classbook (Ed. 1):197. 1885.

S. pubens Curtis in T. & G., Fl. N. Amer. 2:198. 1842.

S. curtisii var. *pubens* (Curtis) Gray, Proc. Amer. Acad. Arts 17:190. 1882.

5. *SOLIDAGO MISSOURIENSIS* Nutt. var. *TENUISSIMA* (Wooton & Standley) C. & J. Taylor, comb. nov.

Solidago tenuissima Wooton & Standley. Contr. U. S. Natl. Herb. 16:182. 1913.

TYPE: NEW MEXICO: from Guadalupe Canyon near Cloverdale, 15 Jul 1892, Mearns 466 (US!).

This taxon was considered by Kearney & Peebles (1951) as a synonym of *S. missouriensis* and since then, this tall, sparsely leaved western montane variety has not been recognized in floras. This variety grows along stream edges and wet areas of the Rocky Mountains, especially the Ponderosa Pine Zone. We have seen specimens from Arizona, New Mexico, and Colorado. Plants are 7–8 dm tall. The base of the stem is densely and closely sheathed with leaf petioles, the basal leaves being absent at anthesis. Stem leafy, leaves linear up to 11 cm long and 0.6 cm wide, gradually diminished upward to 4 cm long by 0.2 cm wide; fastigiate branching not present. Inflorescence longer than broad, branches up to 4 cm long, generally not much recurved, sparsely pubescent to glabrate. Upper leaves with occasional teeth, 2 or 3 to a side and over 1 mm long, apices acute. Plants sparsely pubescent to glabrous in the inflorescence.

6. *SOLIDAGO WRIGHTII* Gray, Proc. Amer. Acad. Arts 16:80. 1880.

TYPE: TEXAS: mountains between the Limpia and the Rio Grande [probably in Davis Mts. in Jeff Davis or Culberson Co., (McKelvey, 1955)] Aug 1849. *Wright* (Gray's assigned No. 281) (GH!, US!); and from Mt. Graham, Az, alt. 9,000 ft, *Rothrock* 730 (GH!).

This taxon has been a taxonomic and a nomenclatural problem. A species of the southwest, with large heads and ovate leaves, appears to be closely allied to *Solidago petiolaris* Ait. of the central and eastern United States. Its inflorescence varies from a densely flowered much branched panicle to few heads (6–8) on long peduncles forming a cymose type flat-topped terminal inflorescence. Herbarium specimens of the extremes and every variation in between in a continuum is clearly evidence for gene flow between the two forms. Gray (1880) named the paniculate form *S. bigelovii* (a nomen nudum) and the form with somewhat cymose inflorescences *S. wrightii*.

Two years later Gray (1882) evidently recognizing both forms as being related, published a description of *S. bigelovii* and placed *S. wrightii* as a

variety. This combination is invalid since *S. wrightii* has precedence over *S. bigelovii*. To complicate matters, *Solidago wrightii* var. *adenophora* was described by Blake (1929) as a variety having stipitate glands on the involucre, pedicels, stem, and leaves. The type at US is not only densely glandular pubescent, it has a robust panicle. The types of both *S. wrightii* (GH!, US!) and *S. bigelovii* (GH!, PH!) are densely pubescent and without stipitate glandular hairs. Examination of herbarium specimens from the southwestern United States shows every shade of gradation from pubescent only with short nonglandular hairs to a mixture, to all hairs being stipitate glandular. Both types, cymose and paniculate inflorescences, can be glandular or eglandular pubescent. Thus 4 extremes may be found: cymose-glandular, cymose-eglandular, paniculate-glandular and paniculate-eglandular pubescent. It is most probable that the difference in inflorescences and head number is based on greater genetic diversity than the variation in types of pubescence. Therefore, two varieties should be recognized rather than four, and the inflorescence rather than pubescence used to separate them.

- A. Heads cymose, singular or few on long pedicels forming a somewhat flat-topped inflorescence..... *S. wrightii* var. *wrightii*
 A. Heads in panicles, generally lower branches in inflorescences leafy, flowers clustered towards the ends..... *S. wrightii* var. *adenophora* Blake (*S. bigelovii* Gray)

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